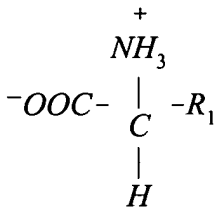
CLAIMS

What is claimed is:

1. A composition comprising an effective amount of a peptidic compound comprising a moiety which is phosphorylated, or which is capable of being phosphorylated, and a pharmaceutically acceptable excipient, wherein the compound is effective in reducing a serum phosphate level in an individual.

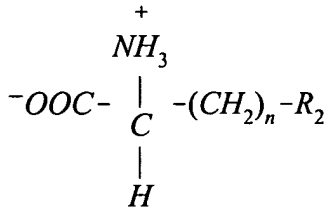
2. The composition of claim 1, wherein said peptidic compound comprises monomer units selected from the group consisting of:

(a) a unit (I) selected from the group consisting of a coded amino acid, a non-coded amino acid, and a synthetic amino acid, of the general structural formula (I'):



wherein R_1 is any moiety connectable to the carbon atom; and

(b) a unit (II) selected from the group consisting of a coded amino acid, a non-coded amino acid, and a synthetic amino acid, of the general structural formula:

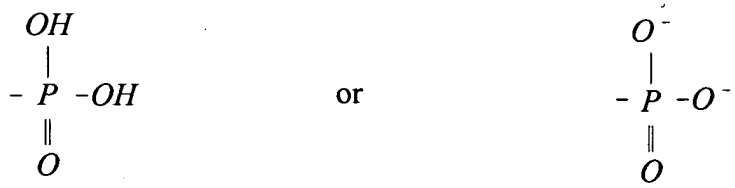


wherein R_2 is any moiety which is phosphorylated or which is capable of being phosphorylated, wherein n=0 to 10.

3. The composition of claim 2, wherein R_1 is a side chain of an amino acid selected from the group consisting of glycine, alanine, valine, leucine, isoleucine, phenylalanine, serine, threonine, tyrosine, aspartic acid, and glutamic acid.

4. The composition of claim 2, wherein R_1 is -H.

5. The composition of claim 2, wherein R_2 of each monomer unit is independently selected from the group consisting of $-CH_2OX$, $-CH(OX)-CH_3$, $-CH_2(phenyl)-OX$, wherein X is H,



6. The composition of claim 2, wherein units I and II are in alternating positions $(I\text{-}II)_m$, wherein m is an integer from 1 to 7.

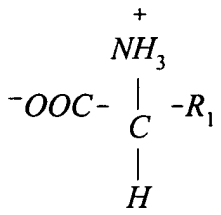
7. The composition of claim 6, wherein the peptidic compound comprises about 7 covalently linked groups of alternating units of glycine and serine.

8. The composition of claim 6, wherein one or more of the serines is phosphorylated.

9. The composition of claim 1, wherein the compound increases bone phosphorus content in an individual.

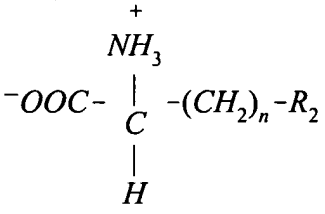
10. A method of reducing a phosphate level in the serum of an individual, comprising administering to an individual in need thereof an effective amount of a composition comprising a pharmaceutically acceptable excipient and an effective amount of a compound comprising monomer units selected from the group consisting of:

(a) a unit (I) selected from the group consisting of a coded amino acid, a non-coded amino acid, and a synthetic amino acid, of the general structural formula (I'):



wherein R_1 is any moiety connectable to the carbon atom; and

(b) a unit (II) selected from the group consisting of a coded amino acid, a non-coded amino acid, and a synthetic amino acid, of the general structural formula:



, wherein said compound comprises a moiety which is phosphorylated or which is capable of being phosphorylated, and wherein the composition reduces a serum phosphate level in the individual.

11. The method of claim 10, further comprising reducing bone loss in an individual.

12. A method of treating hyperphosphatemia, comprising:

administering to an individual a therapeutically effective amount of a composition comprising a pharmaceutically acceptable excipient and a peptidic compound characterized by (a) oral bioavailability, (b) 4 to 30 residues, and (c) having at least one residue which is phosphorylated

or which is phosphorylatable *in vivo* or *in vitro*.

13. The method of claim 12, wherein the composition comprises 1 to 1,000 mg of the peptidic compound.

14. The method of claim 12, wherein the individual is a mammal.

15. The method of claim 14, wherein the peptidic compound is further characterized by reducing serum phosphate levels 5% or more in the mammal.

16. The method of claim 12, further comprising:

repeatedly administering the composition once a day or more over a period of 30 days or more.

17. A method of increasing incorporation of phosphorus into bone in an individual, comprising administering to the individual a therapeutically effective amount of a composition comprising a pharmaceutically acceptable excipient and a peptidic compound characterized by (a) oral bioavailability, (b) 4 to 30 residues, and (c) having at least one residue which is phosphorylated or which is phosphorylatable *in vivo* or *in vitro*.

18. A method of increasing bone strength in an individual, comprising administering to the individual a therapeutically effective amount of a composition comprising a pharmaceutically acceptable excipient and a peptidic compound characterized by (a) oral bioavailability, (b) 4 to 30 residues, and (c) having at least one residue which is phosphorylated or which is phosphorylatable *in vivo* or *in vitro*.

19. A method of treating a bone disease in an individual, wherein the bone disease is characterized by reduced bone phosphorus content, the method comprising administering to the individual a therapeutically effective amount of a composition comprising a pharmaceutically

acceptable excipient and a peptidic compound characterized by (a) oral bioavailability, (b) 4 to 30 residues, and (c) having at least one residue which is phosphorylated or which is phosphorylatable *in vivo* or *in vitro*.